relation to fluvial nutrient and heavy metals transport. Whilst some limited data on sediment-associated chemical properties are presented by Meybeck (Chapter 4), sediment-associated nutrient and contaminant transport is largely ignored.

Furthermore, in the conclusion to the overview, it is argued that: 'In order to determine response times there is a need for well-dated high-resolution geologic records, especially those of short term events. Some lakes, for example, are likely to have a sedimentary record of atmospheric fluxes as detailed as that obtained from ice cores' (p. 11). Despite this recognition, the growing body of palaeoecological and palaeoenvironmental evidence, including that derived from lake sediment-based reconstruction (cf. Berglund, 1990), is totally ignored. Whilst there is no global database of lake and reservoir reconstruction, some of the critical regions for increased sediment flux following late-glacial ice retreat have well-documented changes in sediment yield, often at finely resolved timescales. Thus, the volume does not provide quite the comprehensive review promised in the preface. However, the chapters themselves are well-written and authoritative and contain many new perspectives on available global data bases. For the hydrologist and fluvial geomorphologist, the individual contributions to this volume are therefore well worth reading, although as a comprehensive state-of-the-art review it is sadly lacking in a number of key areas.

Variability in Erosion contains 54 pre-published research papers presented at the IAHS Canberra symposium, which have been organized into six major themes: (1) soil erosion, sediment transport and sediment tracers; (2) flood plains and lake sedimentation; (3) large basins and regional variations; (4) small basins; (5) human impacts; and (6) techniques. As a proceedings volume the subdivision of chapters is retrospective and the contents reflect the research activities of those contributors able to attend the meeting. The 54 papers were contributed by authors representing 25 countries. Papers are presented on variability in most of the world's major geographical regions, with the exception of Africa and the Middle East, and a relatively minor contribution from the USA. Nevertheless, the volume is not dominated by Australian research, despite the location of the conference, and the reader of this volume will be exposed to a wide range of environments which pose very different problems in analysing and interpreting soil erosion and sediment transport data.

Like many IAHS publications, the quality of papers is variable. However, the organizers and editorial committee should be congratulated for attracting a wide range of contributions dealing with a number of critical issues. Like *Material Fluxes*, this publication reflects academic interest in sediment transport at a range of spatial and temporal scales, as well as the techniques currently used to estimate flux rates and sediment sources. Whilst it is not possible to provide a comprehensive review of all papers in this volume, two papers (deBoer, pp. 125–132, and Desloges and Gilbert, pp. 133–142) directly address the problems of reconstructing environmental disturbance and extreme event contributions to sediment yields from dated lake sediment sequences, which begin to address one of the fundamental issues raised in *Material Fluxes*. Other contributions identify the significance of river regulation for sediment delivery (Olive *et al*., pp. 241–249) and temporal changes in the contribution of gully erosion to the sediment yield of a Norwegian river system (Bogen *et al*., pp. 307–315). The short cameos presented in *Variability in Erosion* provide stimulating discussions and observations on a wide range of topical geomorphological issues and techniques, consider fundamental problems of isolating measurement reliability from inherent natural variability, and provide an excellent source of information on current research activities concerning stream erosion and sediment transport.

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PHYSICS FOR GEOLOGISTS by Richard E. Chapman, University College London Press, London, 1995. No. of pages: 143. Price: £12.95 (pb), £35.00 (hb). ISBN 1-85728-260-4 (pb).

This book undoubtedly addresses a real need for many students within the broadly defined Earth Sciences – a refresher/primer on some of the basic principles of physics. It has the essential quality that it is extremely easy to read, and the style of explanation is generally excellent. This will relieve many students, who may be daunted by an exhumation of principles taught way back in the dark murky hollows of their educational graveyard. So put away the crosses and garlic, this is a book almost to leave on your coffee table or draining board. In this sense it is a success, and can be recommended as background for a wide range of Earth Science undergraduate courses.

The book is structured into 12 chapters of various lengths covering 'basic concepts' (dimensions and dimensional analysis), forces, optics, atomic structure, electromagnetic radiation, heat and heat flow, electricity and magnetism, stress and strain, sea waves, acoustics, fluids and flow and a final seven pages on the dangers of linear regression. Phew! With all this in only 143 pages something had to suffer, which indeed it has given the brevity of some chapters. Other chapters also seem a little isolated (those on sea waves and linear regression being the most lonely).

There are some frustrating facets to this book. For instance, the references supplied for further use are not up-to-

date and do not give enough specific applications to the Earth Sciences. Of the 59 works cited in either 'references' or 'further reading', 25 per cent are to entries in the 1984 *Encyclopaedia Britannica* and only 15 per cent concern works published after 1980. Some of the older references are key ones, but this should not lead to exclusion of more recent Earth Science references to enthuse students who have gained from other parts of the text. For instance, how can the last few pages on linear regression fail to point the student to the excellent text by Davis (1986), which goes into far more depth on this topic? Annoyingly, some of the equations are numbered whilst others are not (which will make tutorial use of the book more difficult), and some things are plainly wrong. For instance, p. 103 discusses the laminar/turbulent transition by stating that the smooth upper surface of a stream shows laminar behaviour until the stream narrows and becomes rough water, this error being especially inappropriate since it follows closely a paragraph that laments a literature full of careless errors on the subject of fluid flow.

Lastly, for use as an ancillary course text I would have liked to see more problems and examples, with workings and solutions, after each chapter. This would have both addressed the above point of Earth Science relevance and provided a more readily usable text as either part of a course or in tutorials. Given the competition that this book faces, in part, for instance, from the excellent *Mechanics in the Earth and Environmental Sciences* by Middleton and Wilcock (which does provide problems), the inclusion of these examples seems a serious omission.

However, even given its shortcomings and the obvious requirements for any second edition, a copy of this book should reside on library shelves and will be very well used. In places, it acts more like a dictionary, but it makes basic principles accessible to those who may need to renew their background in these fundamentals of physics, but have not yet found an accessible source.

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SPACE AND TIME VARIABILITY AND INTERDEPENDENCIES IN HYDROLOGICAL PROCESSES edited by Reinder A. Feddes, Cambridge University Press, Cambridge, 1995. No. of pages: xii + 181. Price: £55.00 (hb). ISBN 0-521-49508-3.

Scale problems are a hot topic for meetings in hydrology. This volume arises from the first George Kovacs colloquium of the International Hydrology Program/International Association of Hydrological Sciences, held in Paris in July 1992. The proceedings of another workshop, on 'Scale Issues in Hydrological Modelling' in Robertson, Australia, in December 1993 have also just been published by John Wiley & Son Ltd (edited by Jetse Kalma and Murugesu Sivipalan). There will be further workshops in 1996 in Vienna and Wallingford, and the study of scale problems in time and space is intrinsic to programmes such as BOREAS, GEWEX, GCIP and the NERC TIGER and LOIS programmes. The major problems being addressed are:

(i) what are the constraints on the change in hydrological behaviour in moving from one scale to another, given the time and space variability apparent in hydrological responses?
(ii) how far are such constraints evident in field data?
(iii) can a theory of scaling be developed to reflect such constraints, such that observations at one scale can be used to infer behaviour at another? and
(iv) what are the implications of scale-dependent behaviour for modelling global change, in both upscaling small-scale heterogeneity to the grid scale of global models, and downscaling grid-scale predictions for use at smaller scales?

All these problems are apparent in the papers in this volume, which generally maintain a high standard of presentation in combining review material with new research. After the opening address of the colloquium by Shamir, the papers may be broadly grouped into three sets. First, there is a set of papers that concentrate on scale problems in hydrological responses. These include papers by Wood on 'Hetereogeneity and scaling land-atmospheric water and energy fluxes in climate systems', Dooge on 'Scale problems in surface fluxes', Feddes on 'Remote sensing-inverse modelling approach to determine large scale effective soil hydraulic properties', Hatton *et al*. on 'The importance of landscape position in scaling SVAT models to catchment scale hydroecological prediction', Becker on 'Problems and progress in macroscale hydrological modelling', and Nachtnebel on 'Dependencies of spatial variability in fluvial ecosystems on the temporal hydrological variability'.

There is then a set of papers dealing more specifically with the interaction of atmospheric models with land surface hydrology, including Entekhabi on 'The influence of subgrid-scale spatial variability on precipitation and soil moisture in an atmospheric GCM', Henderson-Sellers *et al.* on 'Modelling the hydrological response to large scale land use change', Avissar and Chen on 'Subgrid-scale fluxes in GCMs demonstrated with simulations of local deforestation in Amazonia', Kite *et al.* on 'A hierarchical approach to the connection of global hydrological and atmospheric models', and Bardossy on 'Stochastic downscaling of GCM-output results using atmospheric circulation patterns'. The final group of papers is concerned with the use of fractals as a description of scaling behaviour and include Nicolis on 'Predictability of the atmosphere and climate: towards a dynamical view', Shertzer and Lovejoy on 'From scalar cascades to lie cascades: joint multifractal analysis of rain